

# OVERVIEW of RoHS LEGISLATION in EUROPE and CHINA



# What is RoHS?

RoHS stands for Restriction of Hazardous Substances. The restriction applies to certain levels of Lead (Pb), Mercury (HG), Hexavalent Chromium (CRVI), Cadmium (Cd), and several fire retardant chemicals. RoHS only applies to 10 categories of electrical products sold or produced in Europe and China. RoHS takes effect on July 1, 2006. The reason the law was passed was to reduce the amount of chemical pollutants that leaked out of certain products in the landfills in Europe and China. RoHS only applies to ten categories of electrical products, and there are also exemptions, and this list of exemptions is likely to grow. Manufacturers of products, are not required to "prove" that their products meet the new RoHS law, but they are required to make "self-declarations" that their product does meet or exceed RoHS legislation. Each country will determine how they will monitor and test products, should this be needed. If a violation does occur, the manufacturer is required to show that they exercised due diligence in making their product compliant to RoHS, and show how they will comply in the future.

## Levels of RoHS Chemicals

With the exception of Cadmium, the maximum quantity of RoHS chemicals cannot exceed 1/10 of 1% of the entire weight of the product. For example, if your product weighs 1,000 pounds, you cannot have more than 1 pound of lead, mercury, hexavalent chromium, and RoHS fire retardants in your product. The maximum quantity of Cadmium cannot exceed 1/100 of 1% of the entire weight of that particular material. An example of a particular material, would be PVC plastic or plating on metal.

**LEAD (Pb)** - Lead can often be found in most electrical solder, leaded connectors ends, some paints, plastics, electrical boards, etc. A special note: lead is often added to PVC plastic electrical wire casing to make it more flexible. If you are building a robotic machine, where the wire moves continuously, you may need to have a higher concentration of lead in that particular wire casing. But, if you are installing wire, that will never move, then you should attempt to reduce the lead as much as possible. Exemptions to RoHS are: removable batteries, high melting point solder (up to 85% lead), glass used in monitors, televisions, CRTs, fluorescent tube lights, and electronic components (terminations not included), lead in metal alloys (up to .35% in metal and .40% in aluminium, and 4.0% in copper alloys), computer systems and external storage units until 2010, networking products for switching and transmission, electronic ceramic parts. Further exemptions in the near future might include: computer systems, networking, electrical switches, other electrical components, VHDM connectors, fiber optics glass and components, certain solders and/or applications, bearings and bushings

**MERCURY (Hg)** - Mercury is often found in light bulbs, electrical relays and sensors. Exemptions to RoHS are: Fluorescent bulb not exceeding 5 mg per bulb, straight fluorescent tubes,

**HEXAVALENT CHROMIUM (CrVI)** - Often found in the plating of metals and in corrosion prevention coatings. You should pay attention to metals which have been chromed. You can often replace chromated products with Tinned products. Exemptions to RoHS are: anti-corrosion of steel cooling coils of refrigeration products.

**CADMIUM (Cd)** - Often found in the metal plated products, electrical products such as relays and switches, specialty solders, color pigments, and glass products.

**FIRE RETARDANTS (PBB and PBDE)** - Polybrominated Biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE). Oddly enough, people in the USA have gone "hog-wild" with putting fire retardants in every conceivable product possible. In the USA, fire prevention takes the "front-seat" over pollution and health hazards. Where in Europe, the opposite is true. A small group of litigation attorneys in the USA has been working hard to make millions off of flammable products. This has caused many manufacturers to put fire retardants into their products to avoid immediate liability. There are some unbiased experts who feel that the fire retardants may actually cause more deaths than products without fire retardants. As many people know, legal liability can change quickly. Those manufacturers who are pouring fire retardants into every product possible might find themselves in "hot water" in the future. Both halogenated and glass fire retardants have their own hazards. This is an area that needs to be closely watched.

# What are the 10 Categories?

RoHS only applies to ten categories of electrical and electronic products. Any device that depends up voltages greater the zero volts and not exceeding 1,000 volts (AC) or 1,500 volts (DC) and fall into the 10 categories of items are required to follow the RoHS legislation. The 10 categories are often referred to as, "Waste Electrical and Electronic Equipment (WEEE)". Exempts from these categories are Industrial machine and replacement parts for equipment that went on the market or into service prior to July 1, 2006, . Listed below are the 10 categories:

**1. LARGE HOUSEHOLD APPLIANCES** - Examples are microwaves, electric stoves and plates, refrigerators, dish washers, freezers, washing machines, clothing dryers, fans, air conditioners, central vacuum systems, and other large electric devices normally found in homes.

**2. SMALL HOUSEHOLD APPLIANCES** - Examples are , electric frying pans, coffee machines, electric can openers, sewing machines, clothing irons, hair dryers, hair irons, electric shavers, clocks, watches, electric scales, and other small electric devices normally found in homes.

**3. COMPUTER AND TELEPHONE EQUIPMENT** - Examples are , computer equipment found in homes and businesses, such as, personal computers, laptops, main frames, and computer components, such as, mouse and keyboards, calculators (electric, battery, and solar), typewriters, fax machines, photocopiers, telephone systems, telephones, and other computer and telephone devices normally found in homes and businesses.

**4. CONSUMER ELECTRONICS** - Examples are , television, battery and electric music players, recorders and equipment, electronic musical instruments, and other consumer electronics normally used by consumers.

**5. LIGHT BULBS** - Examples are , straight fluorescent tubs, fluorescent bulbs, sodium bulbs, metal halide bulbs, and other light bulbs and tubes normally used by consumers and businesses. Filament bulbs and bulbs used in residential settings are exempt.

**6. TOOLS** - Examples are , electric drills, saws, welders, lathes, sanders, spray painters, air compressors, electronic screw drivers, network testers, electric lawn mowers (gas driven are not included), electric weed wackers only (gas driven are not included), and other electric or electronic tools normally used by the public.

**7. ELECTRONIC ENTERTAINMENT ITEMS** - Examples are , video games, electronic stop watches, train sets, electronic games, and other electronic entertainment items normally used by consumers, organizations, and businesses.

**8. MEDICAL EQUIPMENT** - Examples are , radiotherapy equipment , pulmonary ventilators, and other medical. Due to the critical nature of some medical equipment, we do expect more exemptions. Since HMS Industrial Networks is under the jurisdiction of medical equipment, is it exempt from RoHS, but they have already agreed to comply.

**9. CONTROL EQUIPMENT** - Examples are , thermostats, and other control instrumentation. Since HMS Industrial Networks is under the jurisdiction of Control Equipment, they are exempt from RoHS, but they have already agreed to comply.

**10. AUTOMATIC FOOD DISPENSERS** - Examples are , coffee machines, candy machines, soda machines, and other packaged or unpackageed food dispensers that are normally used by the public.

## EXEMPTIONS:

**STATIONARY INDUSTRIAL TOOLS** - Any fixed stationary industrial tool designed to be used for industrial applications are exempt from RoHS. Examples would be CNC milling machines, Drill presses, plastic injectors, etc.

**REPLACEMENT PARTS** - Replacement parts for products in the WEEE categories placed on the market before July 1, 2006 are exempt from RoHS. These replacement parts may be either new or used.

**MILITARY EQUIPMENT** - Military equipment is exempt from RoHS.

**CAR, AIRPLANE AND BOAT EQUIPMENT** - Equipment *specifically* designed to be installed in cars, aircrafts and boats are exempt from RoHS. For example, a fixed car radio is exempt, but a removable radio is not exempt.

**MEDICAL EQUIPMENT** - Certain medical equipment that handle blood or infectious material are exempt from RoHS.

**RFID** - Radio Frequency ID labels on packages are exempt from RoHS. RFID put on or inside electronic equipment are not exempt.

**EXTERNAL CABLING** - External fixed cables outside of electronic devices are exempt from RoHS. This includes fiber optics, networking cable, etc. Any cabling inside the box, or permanently fixed to the electronic device are not exempt from RoHS.

## **FURTHER EXEMPTIONS TO BE CONSIDERED ON NOVEMBER 2, 2005**

- Lead in tin-whisker-resistant coatings for fine-pitch applications;
- Chromium (also in oxidation state VI) and cadmium as coloring-batch additions, up to 2 % content in glass, crystal glass, lead crystal, or full-lead crystal, used as a decorative or a functional part of electric or electronic equipment.

*(Connectors can be plated with Tin or Chromated. Chromated connectors have a beautiful finish, which would be restricted under the original RoHS legislation.)*

- Solders containing lead and/or cadmium for specific applications;
- Hexavalent chromium (CRVI) passivation coatings;
- Lead in connectors, flexible printed circuits, and flexible flat cables,

*(Many experts are concerned that lead-free soldering will lead to significant number of failures. While many connectors can be made to meet RoHS legislation, the need to solder them with lead or lead/tin alloy needs to take priority. Lead is also used to make cables more flexible. Some cables need to have flexibility to prevent premature failures.)*

- Cadmium pigments except for applications banned under Directive 91/338/EEC amending Directive 76/769/EEC relating to the restriction on the marketing and use of certain substances;
- Low-melting-point alloys containing lead;
- Galvanized steel containing up to 0.35% lead by weight and aluminum with an unintended lead content up to 0.4% lead by weight in electrical and electronic equipment;
- Lead in solder and hexavalent chromium in surface treatment, in parts recovered from production printers and copying equipment, sold, rented or leased or otherwise returned from professional users other than private households, originally put on the market before July 1, 2006, and reused for the same purpose by the original manufacturer until 1 July 2011;
- Applications of lead, mercury, cadmium, hexavalent chromium, PBBs, and PBDEs in electrical and electronic equipment in the aeronautic and aerospace sectors that require high safety standards.

---

With the RoHS legislation effective date of July 1, 2006 coming soon, and as engineers find themselves boxed into a corner with unworkable or unreliable solutions, there will be many more exemptions to come. You need to stay alert to changes in RoHS legislation.